level of these booklets was grade 8 using the Flesch-Kincaid scale (range, grade 8-9) and grade 11 using the SMOG scale (range, grade 11-12). Their mean word-to-content ratio was 68:1.

Comment. The findings of this study reveal that patients prescribed warfarin are very likely to receive information sheets from community pharmacies that contain only 63% of the content important for its safe use as well as statements that experts believe are misleading or incorrect. Comprehension of these sheets is also limited by a reading level approximately 5 or 6 grade levels above that recommended for health information.[4] The readability results found in this study are consistent with previous research reviewing drug-related patient education brochures,[5] where the mean reading level was grade 11. In a study of warfarin therapy, more than half of patients were unable to comprehend health-related words at levels beyond grade 8,[6] and an increased risk of bleeding and nonadherence has been reported in patients with low literacy.[7,8]

The major limitation of this study is the absence of a gold standard for content of warfarin information; however, we relied on consensus from experts to create a reference standard. Although we reviewed PES distributed by Ontario pharmacies, the results are likely generalizable, since many community pharmacies across the country use information sheets obtained from the same small number of drug information databases. Since the drug information programs were produced by 5 different American and European software companies, our findings likely apply to warfarin PES at least across North America.

Appropriate and accurate information about warfarin is critical in helping patients make educated health care decisions. We suggest that standardization of the content of patient information about warfarin, developed with input from anticoagulation specialists and presented in a manner that is understandable by the majority of patients taking this medication, is an important patient safety priority. This approach to patient education must also be considered for other high-risk medications including the new oral anticoagulants and other medications with a narrow therapeutic index.

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INVITED COMMENTARY

Left Behind: Ensuring Clarity and Completeness of Our Educational Materials and Messages

Sometimes it seems that despite our best efforts to educate patients and families, we miss the mark. During internship, one of us (D.A.D.) sat down with the mom of a 2-year-old child to discuss the child's condition and plan for care. After spending time "clearly" explaining things to her, the mom looked up with a bewildered yet calm look and said, "I have no idea what you just said." This mom was lost. Thankfully, she had the courage to speak up. Often, we assume that we speak and write clearly and that our communication is effective; yet for various reasons, there is a gap between what patients know and what health care providers think they should know.

Failure to consider the literacy levels and learning needs of patients when designing educational messages is one way in which we leave our patients behind. An article by Diamantouros and colleagues[1] assessed the accuracy, completeness, and reading level of 5 warfarin education materials provided by community pharmacies or pharmaceutical producers of warfarin. To do this assessment, the authors identified 50 "essential" or "important" knowledge elements (defined by clinical experts in warfarin management) and used tools to assess the reading level of the written materials. They found that the information contained between 22% and 81% of essen-

tial or important knowledge items. In addition, the reading levels of the patient education sheets ranged from 7.7 to 12.5 (several grade levels higher than the recommended sixth grade or below reading level).[2] The authors concluded that the patient information about warfarin had inadequate content coverage and was not understandable by the majority of patients taking the medication.

The article also raises the question of how much information is too much. An expert panel of thrombosis health professionals selected 50 items that they rated as "essential" or "important" for patients to know about warfarin. Although most of us would agree that warfarin is a dangerous medication if not used appropriately, are there really 50 essential and important things for patients to know? The design of patient education materials should move beyond comprehensiveness to consider how much a patient will actually read and retain. From this perspective, an optimal design may not include all 50 elements, particularly if they do not help a patient with daily self-management tasks. After all, it takes more effort to identify and distill information to the most relevant and digestible elements than to create a comprehensive tome. The more complex our messages, regardless of the literacy level at which they are written or the eloquence with which they are spoken, the less people will absorb and the more disinterested they become.[3]

Determining what information should be included in educational materials for warfarin and other potentially harmful medications should be a collaborative and iterative process between health professionals and patients. Most patient education materials try to communicate many concepts, instead of focusing on the 2 to 3 concepts recommended for individuals with low literacy.[4] It may be particularly challenging for experts to identify the most salient information because they recognize the nuances that others may not. However, the nuances are not always important. (When was the last time knowing that insulin is made in the pancreas helped a patient manage their diabetes?) Patients can provide valuable input into the process of selecting concepts of most relevance to them and suggesting ways to ensure that the messages are easily understandable.[5] Omitting patients from content development for educational materials, articulating research questions, developing intervention strategies, or providing input into clinical care processes implies that health professionals are the sole holders of wisdom and that patients either do not possess or are unwilling to provide such knowledge.[6] Not only is this untrue, but this stance runs the risk of disempowering patients, alienating them from care entirely, or increasing their risk of "nonadherence."

Optimal design of patient educational materials must also move beyond "formulas" used in readability assessment tools such as the Flesch-Kincaid and the SMOG. The score for these formulas generally incorporates the total number of words per sentence and syllables per word and indicates the reading level required for a particular text. To be clear, we are not saying that such tools should be avoided. On the contrary, developing patient education materials at a low reading level is necessary but not sufficient to improve comprehension. For example, patient education materials designed to educate people about coronary heart disease, might substitute the word "plaque" for the word "atherosclerosis" to obtain a more favorable readability score. However, such a change would do little to improve a patient's understanding of this disease. Using the phrase "blocked arteries" may result in a higher readability score and is clearer and more meaningful to patients. We should place more emphasis on learning good techniques for message design and get patient input rather than simply following readability formulas.

Patient engagement is a key component of patient- and family-centered care, and patient-centered communication is a key quality indicator.[7] Diamantouros and colleagues[1] offer another example of how we fail to provide patients with information they need to succeed. If we intend to move toward a more patient-centered health care system, we must engage patients in the design of our messages and have them teach us what is most valuable and understandable. Individuals with the highest prevalence of chronic illnesses and those with the greatest need for health care (eg, older adults, racial/ethnic minorities, the poor, and those with low education) also are the least able to read and comprehend information that they need to successfully manage their health conditions.[8] Knowledge and education are valuable resources that are not equally available or accessible to all.[9] Efforts to ensure relevant, literacy-sensitive educational messages to those who will use them may also have the added benefit of furthering the goal of achieving health equity, leaving no one behind.

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